NEWS from ARO-FE (January 2002):

Wideband Wavelength Tunable Ultra-Short Pulse Generation Using Nonlinear Effects in Optical Fibers …. *Norihiko NISHIZAWA and Toshio GOTO; OYO BUTURI, November 2001*

http://www.arofe.army.mil/AROindex.htm (dandreag@arofe.army.mil)

This article was translated from the monthly journal "OYO BUTURI" published, since 1932, by the Japan Society of Applied Physics (http://www.jsap.or.jp/). The "OYO BUTURI," which means *Applied Physics* in Japanese, was the first technical journal in the world using the title *Applied Physics*, reflecting the founders' recognition of the importance of the interaction between Physics and Engineering. The journal covers a very wide range of scientific fields, such as Physics, Electronics, Mechanics, Metallurgy, Chemistry, and various interdisciplinary areas. It serves as a valuable information source for many researchers. It was published even in the difficult period during and immediately following World War II.

Ultra-short pulse lasers are commercially available and their applications have been investigated extensively. Only recently, a wavelength tunable ultra-short pulse source has been realized by adding a special optical fiber cable to an ultra-short pulse laser. Norihiko NISHIZAWA (nishizawa@nuce.nagoya-u.ac.jp) and Toshio GOTO of the Department of Quantum Engineering, Graduate School of Engineering, Nagoya University have developed a compact system for wideband wavelength tunable ultra-short pulse generation using fiber laser and optical fibers (see Figures below for technical insight). Femtosecond pulses are generated in the 1.3-2.0 μm wavelength region. Using a highly nonlinear fiber, a 1.2-1.9 μm broadened and almost flat super continuum is generated. The wavelength tunable ultra-short pulse source will be used in a variety of new applications, such as in the areas of transmitting, high speed, simultaneous communications; and in the field of spectroscopic diagnostics which, among other things, allows the characterization of biomaterials. *Please contact ARO-FE for more information.*

Fig 1:a. Passive mode synchronized ultra-short pulse fiber laser
b. Light intensity regulator. c. Half-wave plate
d. Optical fiber cable keeping polarized electromagnetic radiation. e. Spectrum analyzer. f. Spectrometer
g. Autocorrelator
h. Frequency resolved light gate method diagnostics

Fig. 2: a. Spectrum intensity (arbitrary unit), b. Wavelength (nm)
Fig. 3: a. Wavelength (nm), b. Intensity of incident light (mW)
Fig. 4: a. Intensity (arbitrary unit) b. time (ps)
Fig. 5: a. Wavelength of output light b. time (ps)
c. Wavelength of added high frequency signal (nm)

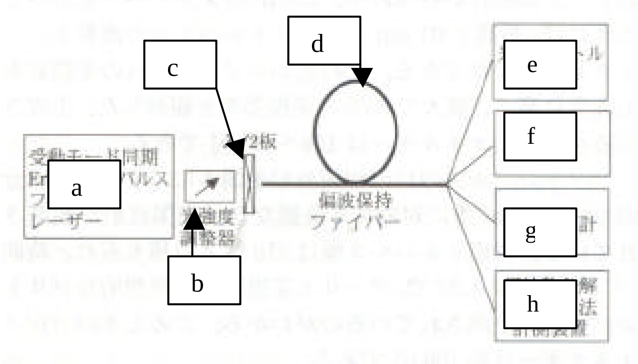

Fig. 1: Schematic diagram of ultra-short tunable pulse laser and diagnostic system

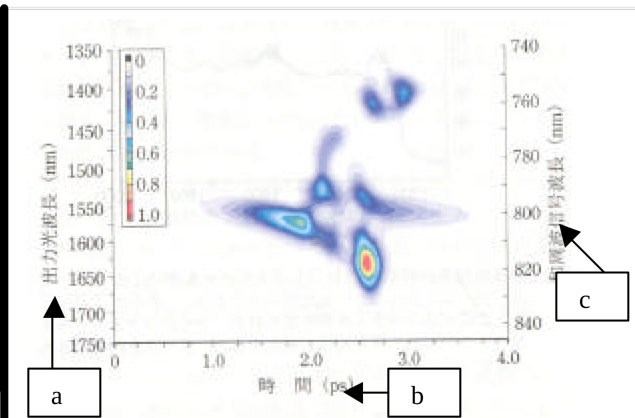

Fig. 5: Wave pattern measured by frequency resolved light gate diagnostics

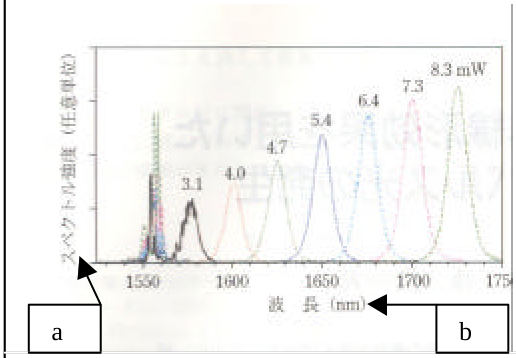

Fig. 2: Spectrum of tunable soliton pulse

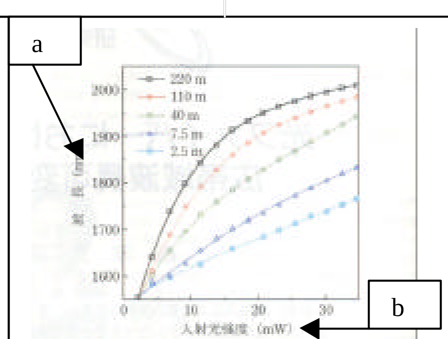

Fig. 3: Shift of wavelength of tunable soliton pulse as a function of intensity of incident light

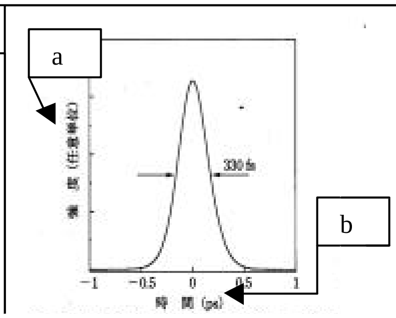

Fig. 4: Auto correlation of tunable soliton pulse light